

AMENDMENTS TO THE CLAIMS

1.-2. (Canceled)

3. (Previously Presented) The apparatus of claim 8, wherein the protuberance comprises a sleeve coupled to the needle.

4. (Canceled)

5. (Previously Presented) An apparatus comprising:
an expandable body having dimensions suitable for percutaneous delivery;
at least one delivery cannula having a lumen therethrough coupled to an exterior portion of the expandable body;

a needle disposed in the lumen of the at least one delivery cannula, the needle comprising a body portion having a protuberance thereon and a delivery end distal to the protuberance;

a first stop disposed in the lumen of the at least one delivery cannula at a position distal to the protuberance on the needle, the stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance; and

a second stop disposed in the lumen of the at least one delivery cannula at a position proximal to the protuberance on the needle, the second stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance,

wherein the first stop comprises a sleeve having an outer dimension less than a dimension of the lumen of the at least one delivery cannula and a lumen therethrough having an inner dimension greater than an outer dimension of the needle at a point other than a point of the protrusion, and

wherein the sleeve comprises a first sleeve and the protuberance comprises a second sleeve coupled to the needle, the second sleeve having an outer dimension comprising a first cross-sectional shape of the at least one delivery cannula at a portion distal to the second stop that is different from a shape of the delivery cannula proximal to the second stop.

6. (Original) The apparatus of claim 5, wherein the first cross-sectional shape is other than circular.

7. (Original) The apparatus of claim 6, further comprising a ribbon disposed in the lumen and extending between the first stop and the second stop, the ribbon modifying a shape of the lumen, wherein the first cross-sectional shape comprises a shape corresponding to the modified shape of the lumen in the presence of the ribbon.

8. (Previously Presented) An apparatus comprising:
an expandable body having dimensions suitable for percutaneous delivery;
at least one delivery cannula having a lumen therethrough coupled to an exterior portion of the expandable body;

a needle disposed in the lumen of the at least one delivery cannula, the needle comprising a body portion having a protuberance thereon and a delivery end distal to the protuberance;

a first stop disposed in the lumen of the at least one delivery cannula at a position distal to the protuberance on the needle, the stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance;

a second stop disposed in the lumen of the at least one delivery cannula at a position proximal to the protuberance on the needle, the second stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance;

a catheter body having a lumen therethrough, the lumen comprising a dimension at a distal end to contain the at least one delivery cannula and a dimension at a proximal end to contain the needle; and

a hub coupled to a proximal end of the catheter body,
wherein the needle extends through the hub and is maintained in a prescribed radial orientation.

9. (Original) The apparatus of claim 8, wherein the protuberance comprises a first protuberance, the apparatus further comprising:

a second protuberance coupled to the needle at a portion within the hub, the second protuberance having dimensions such that the needle may move a prescribed distance within the hub.

10. (Original) The apparatus of claim 9, wherein the coupling of the second protuberance to the needle defines the prescribed orientation of the needle.

11. (Original) The apparatus of claim 9, wherein the needle has a first axial orientation with respect to a distal end of the hub and a different second axial orientation with respect to a proximal end of the hub.

12. (Original) The apparatus of claim 11, wherein the difference between the first axial orientation and the second axial orientation defines an angle of at least 15°.

13.-16. (Canceled)

17.-18. (Canceled)

19. (Previously Presented) The apparatus of claim 21, wherein the protuberance comprises a sleeve coupled to the needle.

20. (Canceled)

21. (Previously Presented) An apparatus comprising:
an expandable body having dimensions suitable for percutaneous delivery;
at least one delivery cannula having a lumen therethrough coupled to an exterior portion of the expandable body;
a needle disposed in the lumen of the at least one delivery cannula, the needle comprising a body portion having a protuberance thereon and a delivery end distal to the protuberance;
a first stop disposed in the lumen of the at least one delivery cannula at a position distal to the protuberance on the needle, the stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance;
a second stop disposed in the lumen of the at least one delivery cannula at a position proximal to the protuberance on the needle, the second stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance,
wherein the first stop comprises a sleeve having an outer dimension less than a dimension of the lumen of the at least one delivery cannula and a lumen therethrough having an inner

dimension greater than an outer dimension of the needle at a point other than a point of the protrusion, and

wherein the sleeve comprises a first sleeve and the protuberance comprises a second sleeve coupled to the needle, the second sleeve having an outer dimension comprising a first cross-sectional shape of the at least one delivery cannula at a portion proximal to the second stop that is different from a second cross-sectional shape distal to the second stop.

22. (Original) The apparatus of claim 21, wherein the first cross-sectional shape is other than circular.

23. (Original) The apparatus of claim 22, further comprising a ribbon disposed in the lumen and extending between the first stop and the second stop, the ribbon modifying a shape of the lumen, wherein the first cross-sectional shape comprises a shape corresponding to the modified shape of the lumen in the presence of the ribbon, and the second cross-sectional shape comprises a circular shape.

24. (Previously Presented) An apparatus comprising:

an expandable body having dimensions suitable for percutaneous delivery;
at least one delivery cannula having a lumen therethrough coupled to an exterior portion of the expandable body;

a needle disposed in the lumen of the at least one delivery cannula, the needle comprising a body portion having a protuberance thereon;

a first stop disposed in the lumen of the at least one delivery cannula at a position proximal to the protuberance on the needle, the stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance;

a second stop disposed in the lumen of the delivery cannula at a position distal to the protuberance on the needle, the second stop defining a diameter of the lumen less than an outer diameter of the needle at the protuberance;

a catheter body having a lumen therethrough, the lumen comprising a dimension at a distal end to contain the at least one delivery cannula and a dimension at a proximal end to contain the needle; and

a hub coupled to a proximal end of the catheter body,

wherein the stop comprises a sleeve having an outer dimension less than a dimension of the lumen of the at least one delivery cannula and a lumen therethrough having an inner dimension greater than an outer dimension of the needle at a point other than a point of the protrusion,

wherein the needle extends through the hub and is maintained in a prescribed radial orientation.

25. (Original) The apparatus of claim 24, wherein the protuberance comprises a first protuberance, the apparatus further comprising:

a second protuberance coupled to the needle at a portion within the hub, the second protuberance having dimensions such that the needle may move a prescribed distance within the hub.

26. (Original) The apparatus of claim 25, wherein the coupling of the second protuberance to the needle defines the prescribed orientation of the needle.

27. (Original) The apparatus of claim 24, wherein the needle has a first axial orientation with respect to a distal end of the hub and a different second axial orientation with respect to a proximal end of the hub.

28. (Original) The apparatus of claim 27, wherein the difference between the first axial orientation and the second axial orientation defines an angle of at least 15°.

29.-30. (Canceled)

31. (Withdrawn) The apparatus of claim 29, wherein the first expandable body and the second expandable body are in a series configuration.

32. (Withdrawn) The apparatus of claim 29, wherein the first expandable body and the second expandable body comprise different dimensions.

33.-74. (Canceled)

75. (Previously Presented) An apparatus comprising:
a catheter cannula having a length suitable for tracking through a portion of a vasculature and a dimension suitable for percutaneous delivery;
a first needle and a second needle extending through a portion of the catheter cannula and having a distal end; and
a hub coupled to a proximal portion of the catheter cannula; and
a first protuberance coupled to the first needle and a second protuberance coupled to the second needle,
wherein the first needle and the second needle are associated with the hub such that a proximal or a distal movement of either needle within the hub is limited by contact between the protuberance and the hub,
wherein the hub comprises a first track and a second track, the first track having dimensions suitable to accommodate the first needle therein and the second track having dimensions suitable to accommodate the second needle therein, and
wherein a proximal portion of each of the first needle and the second needle is associated with the hub according to a prescribed radial orientation.

76. (Original) The apparatus of claim 75, wherein the first track comprises a first portion and a second portion, wherein the first portion has a dimension greater than the second dimension such that the portion of the first needle comprising the protuberance may advance in distal or proximal direction within the first portion.

77. (Original) The apparatus of claim 76, wherein the second portion of the first track has a dimension less than a dimension of the protuberance.

78. (Canceled)

79. (Currently Amended) ~~The apparatus of claim 78, further~~ An apparatus comprising:
a balloon catheter comprising a cannula having a length suitable for tracking through a portion of a vasculature and an inflatable balloon coupled to the distal end of the catheter;
at least one needle having a length suitable for delivering a distal end to the balloon with a proximal end outside the vasculature, the needle comprising a first protuberance on a distal

portion that increases an outer diameter of the at least one needle at a point of the first protuberance;

a hub coupled to a proximal portion of the cannula and retaining the at least one needle according to a prescribed radial orientation by a second protuberance on a proximal portion of the needle;

at least one needle cannula comprising a proximal portion and a distal portion, the needle cannula having a lumen suitable for containing the at least one needle, wherein a distal point of the lumen of the at least one catheter cannula comprises a diameter less than an exterior diameter of the at least one needle at the point of the first protuberance; and

at least one delivery cannula different from the at least one needle cannula and coupled to a proximal portion of the balloon, and having a length dimension suitable for containing at least a portion of the length of the at least one needle, wherein proximally to distally, the at least one needle is disposed through the at least one needle cannula and the at least one delivery cannula.

80. (Original) The apparatus of claim 79, further comprising a sheath ring disposed about the at least one delivery cannula proximal to a plication region of the at least one delivery cannula defined in response to an inflation of the balloon.

81. (Previously Presented) The apparatus of claim 80, wherein the point of the lumen of the at least one catheter cannula comprising a diameter less than an exterior diameter of the at least one needle at the point of the first protuberance is a first point, the lumen of the at least one catheter cannula comprising a second point comprising a diameter less than an exterior diameter of the at least one needle at the point of the first protuberance, and wherein a distance between the first point and the second point defines a travel distance for the at least one needle.

82. (Currently Amended) The apparatus of ~~claim 78~~claim 79, wherein a cross-sectional shape of at least one of the first protuberance and the needle at the point of the first protuberance is different than a cross-sectional shape of the lumen of the catheter cannula at a point at least one of proximal or distal to the point of the first protuberance.

83. (Currently Amended) The apparatus of ~~claim 78~~claim 79, wherein the at least one needle is associated with the hub such that a proximal or a distal movement of the at least one needle within the hub is limited by contact between the second protuberance and the hub.

84. (Currently Amended) The apparatus of ~~claim 78~~claim 79, wherein a distal portion of the at least one needle comprises a superelastic material.

85.-96. (Canceled)